CDF and D0 computing models

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Joint CDF/D0 meeting on data preservation
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Introduction

Goal: preserving Tevatron data and the full analysis capability

Within our task forces we have to:
- define the requirements
- propose possible solutions which meet these requirements.

Common solutions between CDF and D0 should be investigated.

Today:
- the starting point: CDF and D0 computing models
- how can we access data in the long term future? Status and prospects of SAM data handling system
- can virtualization be useful to run our analysis code in the future? Overview of virtualization technology
- Inspire to preserve internal documentation: D0 experience

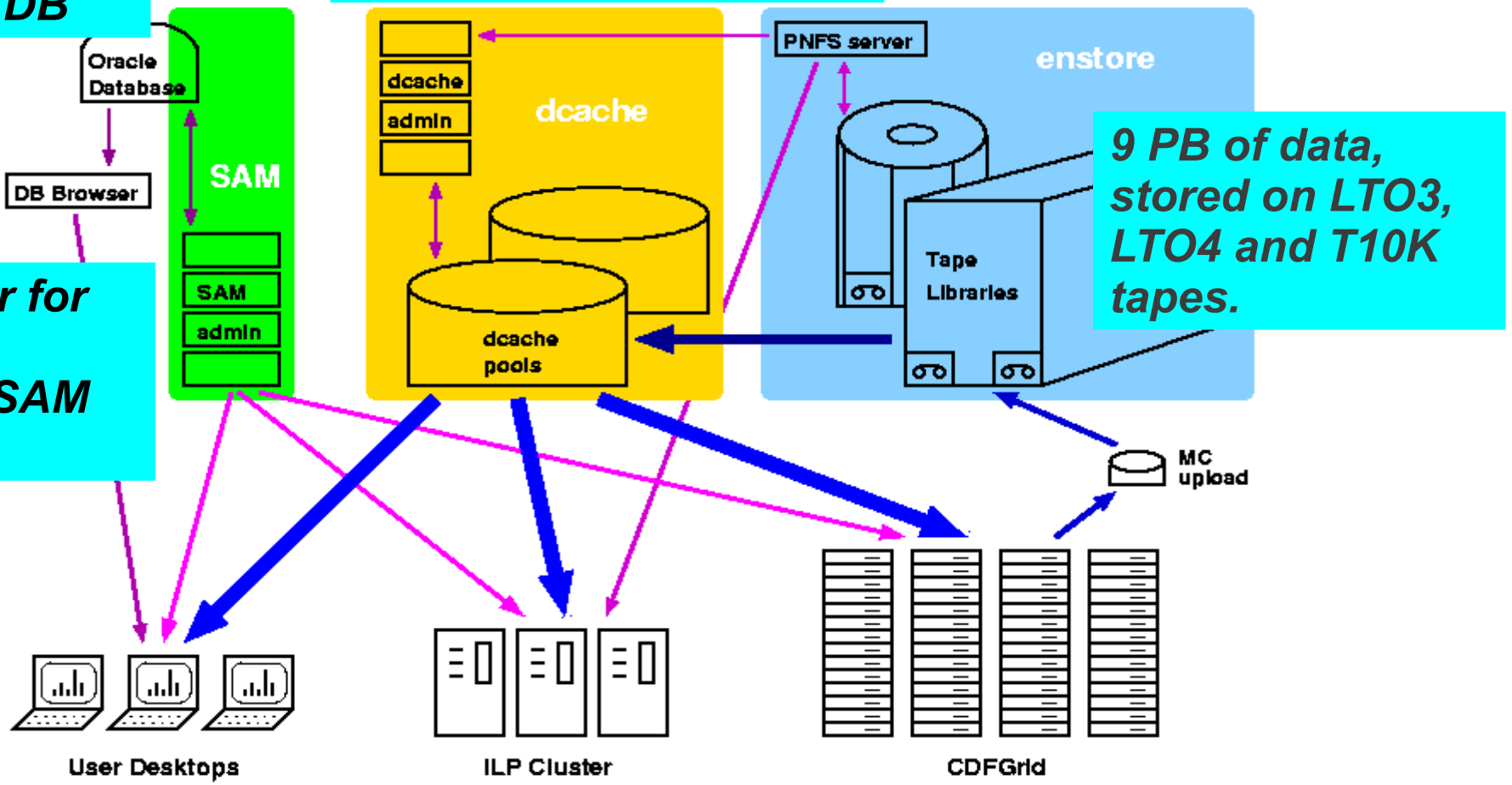
Data storage and access at CDF

Data type	Volume (TB)
MC Prod	1125
MC Ntuples	609
Data Raw	2193
Data Production	3821
Data Ntuples	1400
TOTAL	***9148***

Data handling and access based on SAM + dCache

Dcache fetches files requested by the users and stores them on a distributed pool of disk servers for the user to access over the network.

SAM DB



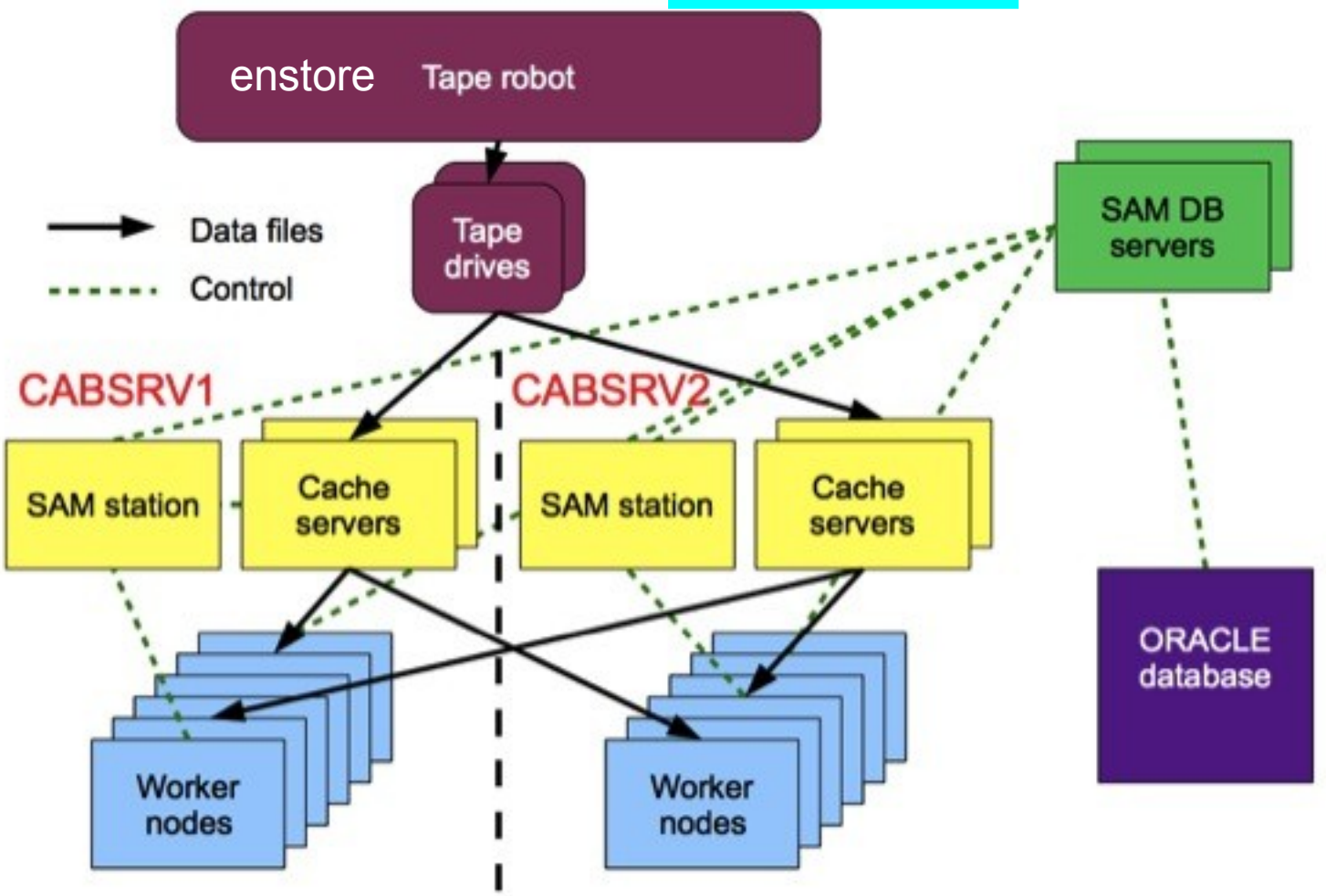
DB browser for individual queries of SAM metadata

9 PB of data, stored on LTO3, LTO4 and T10K tapes.

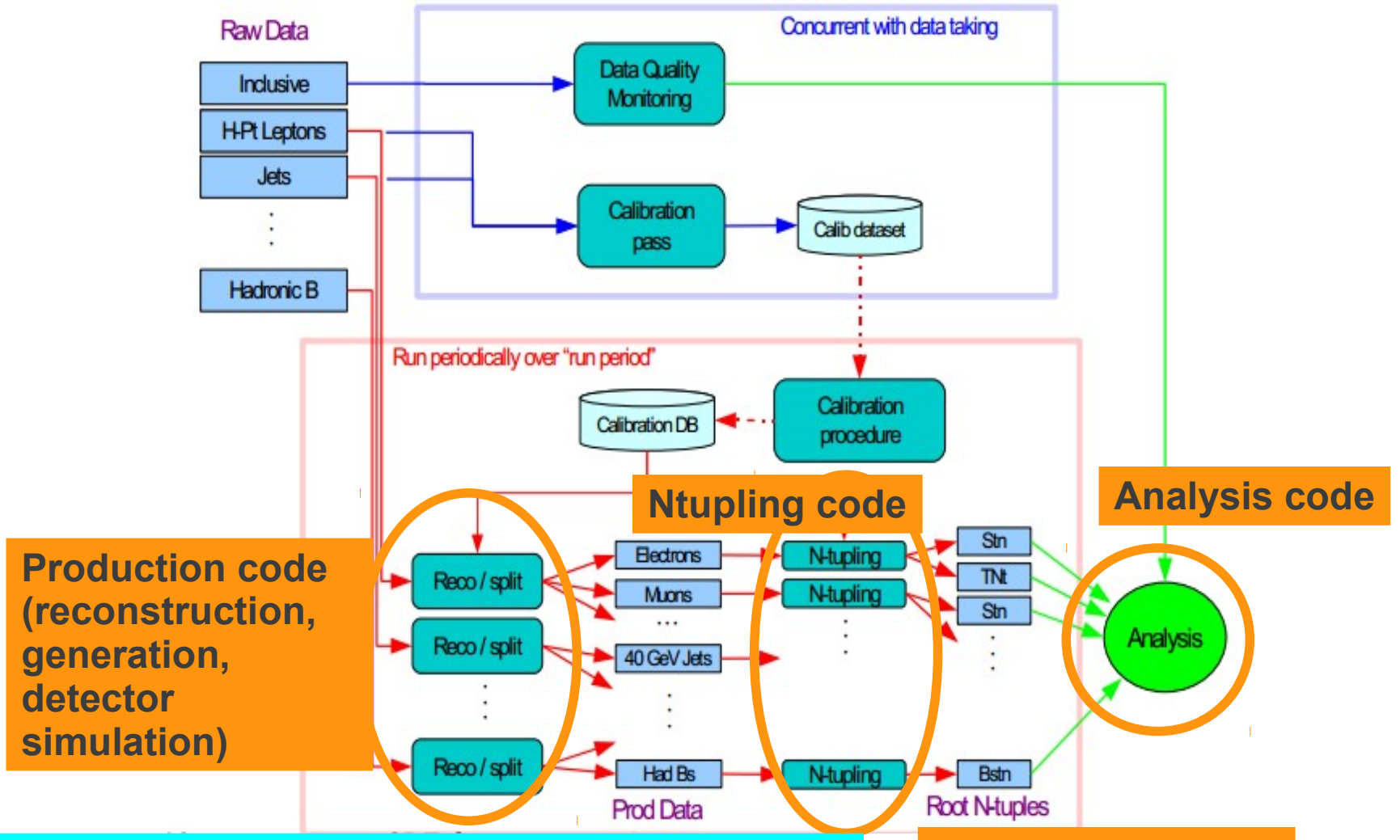
Data storage and access at D0

9 PB of data

NO dCache, direct access to data from SAM



Data processing at CDF



C, C++, Python.
External dependencies: GEANT3, CERNLIB, Neurobayes, Root, Oracle
OS: SL5. New SL6 version in 2013.
Concurrent Versions System, CVS, as software revision control system.

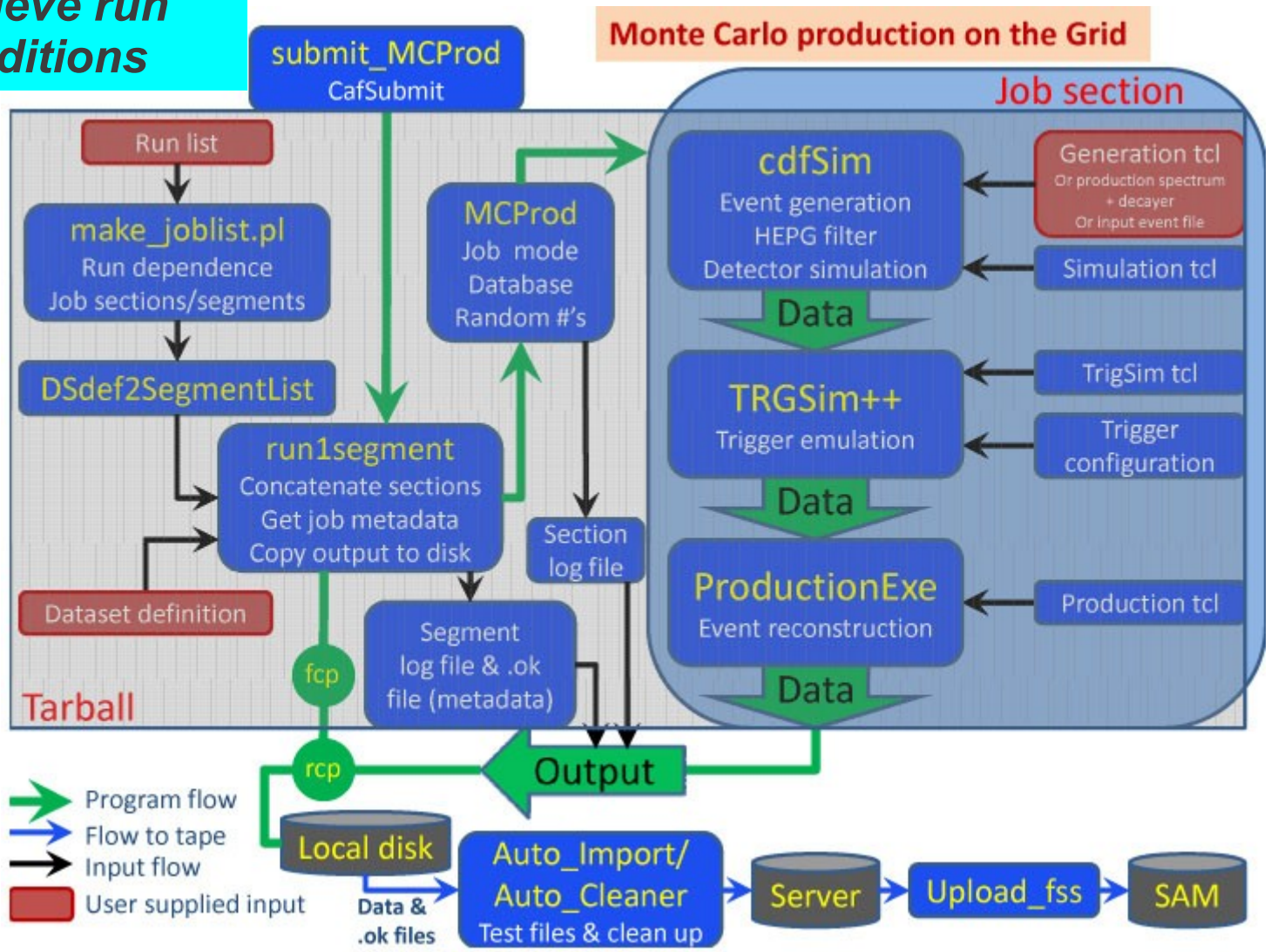
Data processing at D0

- Data reconstruction jobs were submitted to OSG via SAMGrid to
  - DØ's CAB farm
  - Fermilab's GP farm
  - CDF's farm
  - (if needed) opportunistic resources elsewhere
- Output of reconstruction is a "thumbnail" file
  - Summary of the data in DØ-specific format
- Thumbnails were then skimmed and converted into root-trees in separate processing steps
  - This was done on DØ-dedicated resources using PBS batch submission
- External dependencies include Root, Oracle
- OS: SLF5
- Code management: CVS

MC production at CDF

Access to DB (Oracle) to retrieve run conditions

MC production divided into sections, submitted to the Grid



Several event generators included in the framework.

Stdhep files with HEPG events from external generators can be supplied.

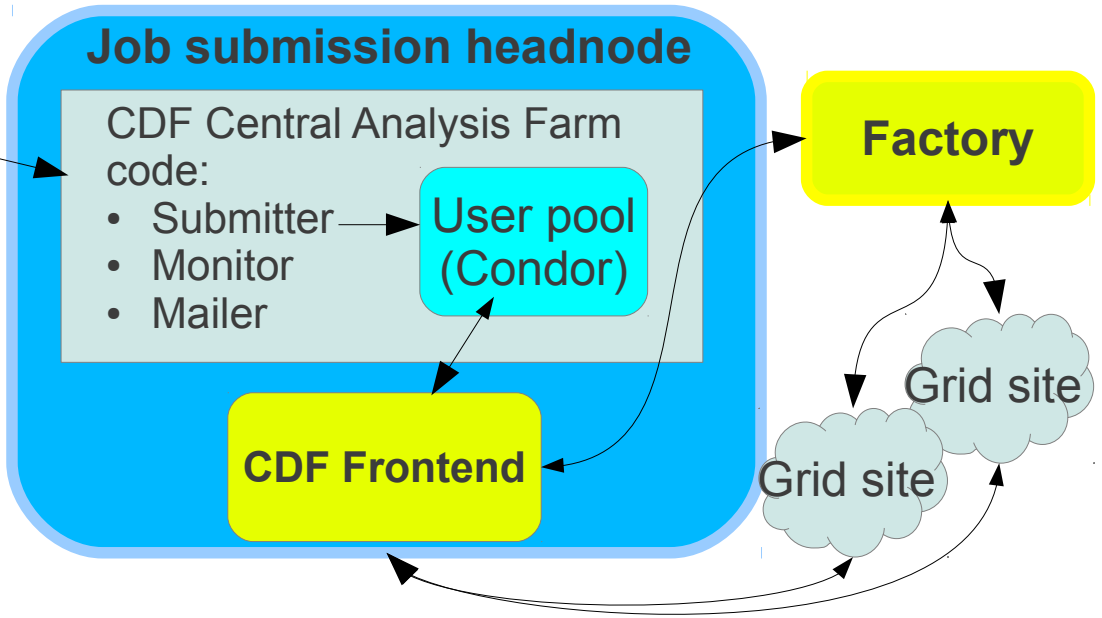
Local disk for output storage and server for upload to SAM.

MC production at D0

- Steps are
  - Generation (several generators supported), GEANT-based detector simulation, detector response simulation (usually includes overlay of zero-bias event from data), and reconstruction
- Jobs run on both DØ-dedicated resources and grid
  - OSG, Native SAMGrid, and LCG (using glide-in)
  - Process is largely automated
    - Requests coded in python and input to SAM request system
    - Automc system takes highest-priority request from SAM, builds job, submits (and resubmits if needed)
- No DB access for MC jobs on worker nodes
  - Needed information stored in files sent with job to worker node

Job submission at CDF

- CDF *Central Analysis Farm code (CAF)* provides the users with a uniform interface to resources on different Grid sites



Four *portals* to access computing resources:

- CDFGrid → headnode and worker nodes onsite at FNAL
- NamGrid → hn onsite, wn offsite (OSG)
- Eurogrid → hn at Tier1 @ CNAF, wn at CNAF and LCG.
- PacCaf → hn in Taiwan, wn in Taiwan/Japan

Based on *glideinWMS* workload management system (batch system = *Condor*)

Authentication:

- Kerberos + FNAL KCA to obtain a X.509 certificate
- VOMS to setup a valid proxy that can be used to submit to the grid.

Analysis job submission at D0

- Analysis jobs submitted via PBS to either
  - Central analysis backend (Fermilab-supported farm)
    - ~6000 cores (shared with production activities)
  - Clued0 (Cluster supported by member institutions)
    - ~500 cores
- Data access directly from SAM
  - or from DØ-dedicated disk, though this is not the preferred way to run
- Output typically stored on DØ-dedicated disk

  Currently have ~500 TB of FNAL-administered project disk plus a few hundred TB of disk on the clued0 cluster

  Anything meant for long-term storage should be put into SAM

Documentation at CDF & D0

Public and internal webpages

Content:

- *Information about detector and trigger*
- *Logbooks*
- *Computing section*
- *Physics groups sections*
- *Webtalks pages (CDF) /Agenda server (CDS agenda) (D0)*
- *Internal notes archive*
- *……*

Format:

- *Html (CDF/D0)*
- *Twiki (CDF)*
- *Tiki (CDF)*
- *Wiki (D0)*

Conclusions

This is only a brief overview, but we can already see how CDF and D0 computing models have
- things in common: data access based on SAM, need for DB access, external dependencies, …
- differences: CDF relies on dCache, D0 does not have jobs submission portals, ...

It is important
- to investigate in more detail
- with the help of experts find out how we could build a common data preservation “framework” (e.g. same data access model, same job submission system, etc...)

We think this should be the *first* joint CDF/D0 data preservation meeting, more have to come.

BACKUP